Salt in Nova Scotia

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Nova Scotia Department of Natural Resources
Mineral Resources Branch
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Introduction

One's association with salt is as old as life itself and as personal as the blood that flows in our veins. Salt, also known as halite, is a chemical compound of sodium and chlorine (sodium chloride, or NaCl). It is found as "rock salt" in underground deposits and as a dissolved solid in oceans, saltwater lakes and seas, and in underground brine wells. It is a common substance in the world around us, and its use is intricately woven into our daily lives.

Salt

Halite (sodium chloride or NaCl), from the Greek word meaning salt. Crystals are cubic, occasionally hopper shaped.

Physical Properties

1. ***Hardness - 2.5***
2. ***Specific gravity - 2.16***
3. ***Luster - transparent to translucent***
4. ***Colour - colourless or white, may have shades of yellow, red blue, purple with impurities***
5. ***Texture - Salty. Highly soluble in water***

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Geology

Nova Scotia's large underground salt deposits are found in a rock unit called the Windsor Group. Deposits are located in the Shubenacadie - Stewiacke Valley area of Hants and Colchester Counties, in Cumberland County, in the Antigonish - Mabou area spanning the mainland and Cape Breton Island, and in the Canso - Bras d'Or region of southeastern Cape Breton Island.

These deposits were created 350 to 335 million years ago, when the existing hot, dry climate caused evaporation of the water in an inland sea, making it extremely "salty". Large amounts of gypsum and anhydrite (calcium sulphate), salt (halite - sodium chloride), salt (halite-sodium chloride), and limestone (calcium carbonate) as well as some potash (sylvite-potassium chloride) precipitated from the dense "salty" sea water. The arid climate and precipitation resulted in the huge deposits of evaporates that are mined in many parts of Nova Scotia today. In some locations, the salt deposits are thicker than 1 500 m.

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Uses

"Pass the salt, please;" surely, we must say this every day of our lives! One of salt's earliest and most familiar uses has been in preparing and preserving food. But the simple, transparent halite crystal is one of the world's most commonly utilized minerals, with over 14,000 additional uses. Today, its major application is in chemical manufacturing: refined salt is used directly in the production of sodium (Na), chlorine (Cl), caustic soda (sodium hydroxide, or NaOH) and hydrochloric acid (HCl). It also plays a major role in the manufacture of leather, textile dyes, soap, glass, pottery, wood pulp and paper, and as an industrial and home water-softening agent. In Nova Scotia, locally produced crushed rock salt is widely used during the winter to remove ice and snow from roads. In a direct link with the distant geological past, salt from those ancient tropical seas makes our northern highways safe for winter travel.

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Mining and Processing

In Nova Scotia, salt is produced by underground mining and by solution mining. At Pugwash, The Canadian Salt Company Limited operates an underground mine where salt is obtained by drilling, blasting and loading in large underground rooms. Not all of the salt is mined, because some is needed to support the roof as large pillars (about 10 m or more in diameter). This type of mining is called room and pillar operation. Huge dump trucks carry the ore to a primary crusher underground. After crushing, it is hoisted to the surface, where the purest salt is stockpiled and used as road salt. The less pure salt is dissolved in water and treated with chemicals to remove the impurities. The salt is then evaporated and these purified salt crystals are crushed and used for table salt, for a multitude of uses in the food industry and for industrial uses requiring a truly pure product.

At Nappan, SIFTO Canada Inc. produces salt by solution mining. This process is an evaporative recovery process where hot water is pumped down drillholes and the salt brine is removed. This method produces only refined salt. You can learn more about these mines by watching the video ***Salt of the Earth,*** available on loan from the Library, Nova Scotia Department of Natural Resources.

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History

Reference to salt springs in Nova Scotia were made in the early 1800s. Attempts at salt mining were made as early as 1813, but little or no production occurred before the 20th century.

In 1912, salt brine was found in a water well in the area of Malagash, Cumberland County. Exploratory drilling, based on this finding, led to the discovery of a major rock salt deposit. In 1918, the Malagash Salt Company opened the province's first salt mine at this site and a new mining industry was born in Nova Scotia.

In 1931, Imperial Oil Limited, while drilling exploratory holes for oil at Nappan, Cumberland County, discovered a huge salt deposit. In 1947, Maritime Industries Limited drilled brine wells there and began production.

By 1956, due to transportation and operating difficulties, the Malagash mine was no longer economical to operate. In search of new resources, Malagash Salt Company sank a shaft in a recently discovered deposit at Pugwash, Cumberland County, to the west of Malagash. In 1959, the company transferred its operations to this new mine, installed a modern evaporation plant, and production increased rapidly. Between 1960 and 1970, annual salt production in the province rose from around 100 000 tonnes to over 800 000 tonnes; for the past decade, annual production has generally been about one million tonnes.

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Current Production

The two Cumberland County mines of Pugwash and Nappan produce all of the province's salt. Annual production is more than enough to fill Nova Scotia's industrial needs. Significant quantities of salt are shipped within Canada to New Brunswick, Prince Edward Island, Newfoundland, Quebec and Ontario. Exports are shipped to such destinations as the West Indies, Saudia Arabia, Panama, Costa Rica, Bermuda and New England.

The old Malagash Salt Company, now known as The Canadian Salt Company Limited, continues to operate the large underground mine at Pugwash. Annual production from the Pugwash mine is around 900 000 tonnes. The Nappan mine is now operated by SIFTO Canada Inc., where annual production is approximately 90 000 tonnes.

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Economic Significance

Salt mining in Nova Scotia is a major industry, employing about 274 people and producing roughly $58 million in annual sales, 10% of the total provincial mineral value. Even at this scale of operation, the province's reserves far exceed current demand. A steady market in salt's traditional applications should ensure the industry's future health.

Mining and the mineral industry are an important part of the economy in Nova Scotia. The mineral industry, including people and companies who explore for minerals, mine them, and manufacture mineral-based products, create wealth and employment. More than 11,000 people are employed directly or indirectly in mining related work. Mining companies pay taxes to several levels of government and royalties to the provincial government. All of the mineral exploration activity and most of the mining operations are located in rural Nova Scotia. Their economic energy creates important local benefits.

In Nova Scotia, the economic benefits of mining are significantly enhanced by the partnership of the federal and provincial governments under various Cooperation Agreements on Mineral Development. Together the two governments are strengthening and promoting the province's mineral industry.

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For further information on salt in Nova Scotia, please contact:

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Additional Sources of Information

- ***Geological Highway Map of Nova Scotia,*** by Howard V. Donohoe and Robert G. Grantham. Atlantic Geoscience Society, 1989. Special Publication Number 1 (Second Edition).
- ***Rock Talk: A Guide to Discovering the Geology, Landscapes and Mineral Resources of Nova Scotia,*** by Craig K. Miller and G. C. Milligan. Nova Scotia Department of Natural Resources, 1996. Information Circular ME 20.
- ***Mineral Rights, Landowners and Mineral Exploration,*** by Howard Donohoe. Nova Scotia Department of Natural Resources, 1996. Information Circular ME 2.
- ***Salt in Nova Scotia,*** by G. Prime. Nova Scotia Department of Natural Resources, 1993. Information Circular ME 19.
- ***Salt and Potash Resources in Nova Scotia,*** by R. C. Boehner. Nova Scotia Department of Natural Resources, 1986. Bulletin 5.
- Available to public school teachers only:

  Salt of the Earth, video production by the Nova Scotia Department of Education and Culture, 1986. Learning, Resources and Technology, Catalogue No. V9773.

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Photos: (Not presently available)

Diamond core drilling in search of additional ore during the 1920s at the former Malagash salt mine.

Underground workings of the former salt mine at Malagash.

Top photo: Large diesel trucks move 35 t of salt from the working face to the crusher for hoisting to the surface.

Right photo: The blasted salt ore is loaded onto large diesel trucks by front end loaders.

Far right photo: An underground salt mine - the Canadian Salt Company Ltd. mine at Pugwash.

Shipment of bulk minerals, such as salt and gypsum, provides considerable business for railroads in Nova Scotia. At Nappan, a Canadian National train switches hopper cars for SIFTO Canada's solution mining operation.

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Figure: (Not presently available)

50 Years of Salt Production

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Map: (Not presently available)

Salt Production in Nova Scotia.

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